Summer Project 2020

Explicit analysis of Markov chains

ניתוח מפורש של שרשראות מרקוב

Abstract

A Markov chain on a finite or countable graph S can be described as a random journey of a particle along the vertices of S, in such a way that upon arriving at a vertex v, and regardless of the path which led to it, the particle chooses its following destination v' at random among v's neighbors in S, according to predetermined probabilities P(v,v').

The transition matrix P holds the answer to a variety of interesting questions concerning the Markov chain, such as, what is the particle's limiting distribution in S, at which the rate is the convergence achieved, and what is the expected number of steps needed to reach v2 from v1.

This theory is nicely summarized in Chapter 1 of the book *Markov Chains* by J. R. Norris (Cambridge University Press) which deals with the discrete case described above. We shall implement it for a non-trivial Markov chain, or maybe two, hopefully reaching interesting conclusions. The prerequisites are an introductory Probability course and a basic acquaintance with matrices.